Scientific Reports, 2016, vol.6

Turning Diamagnetic Microbes into Multinary Micro-Magnets: Magnetophoresis and Spatio-Temporal Manipulation of Individual Living Cells

Lee H., Hong D., Cho H., Kim J., Park J., Lee S., Kim H., Fakhrullin R., Choi I.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© The Author(s) 2016.Inspired by the biogenic magnetism found in certain organisms, such as magnetotactic bacteria, magnetic nanomaterials have been integrated into living cells for bioorthogonal, magnetic manipulation of the cells. However, magnetized cells have so far been reported to be only binary system (on/off) without any control of magnetization degree, limiting their applications typically to the simple accumulation or separation of cells as a whole. In this work, the magnetization degree is tightly controlled, leading to the generation of multiple subgroups of the magnetized cells, and each subgroup is manipulated independently from the other subgroups in the pool of heterogeneous cell-mixtures. This work will provide a strategic approach to tailor-made fabrication of magnetically functionalized living cells as micro-magnets, and open new vistas in biotechnological and biomedical applications, which highly demand the spatio-Temporal manipulation of living cells.

http://dx.doi.org/10.1038/srep38517